

Claims

1. Optical connector assembly for optically connecting to at least one waveguide structure (3) in at least one x-y plane of a layer stack (1), said connector assembly comprising a coupling device (8) providing at least one first optical path (6), said waveguide structure (3) comprising at least one optical waveguide (2) providing at least one second optical path (7) deflecting from said first optical path (6), said coupling device (8) comprising first reference means (19) adapted to co-operate with second reference means (20) in said layer stack (1) characterised in that said second reference (20) means are adapted for aligning said coupling device (8) to said waveguide (2) or waveguide structure (3) in both the x- and y- direction of said x-y plane as to optically couple said first optical path (6) and said second optical path (7).
2. Optical connector assembly according to claim 1, wherein said coupling device (8) comprises third reference means (22) for aligning a mating optical device, providing a third optical path (27), with said waveguide (2) or waveguide structure (3) as to optically couple said second optical path (7) and said third optical path (27).
3. Optical connector assembly according to claim 2, wherein said mating optical device comprises an optical connector (26) having fourth reference means (28) adapted to co-operate with said third reference means (22) of said coupling device (8).
4. Optical connector assembly according to claim 2 or 3, wherein said third reference means (22) and said fourth reference means (28) are guide reference means.
5. Optical connector assembly according to any of the preceding claims, wherein said coupling device (8) comprises an area (18) for providing said first optical path (6).
6. Optical connector assembly according to claim 5, wherein said area (18) comprises an optical component (15).

7. Optical connector assembly according to claim 6, wherein said optical component (15) is a lens or lens array.

8. Optical connector assembly according to any of the preceding claims, wherein said first optical path (6) is
5 deflected under a deflection angle from said second optical path (7) by a reflective layer (14) applied on a facet of at least said waveguide (2) or a mirror mount (17) positioned in said second optical path (7).

9. Optical connector assembly according to claim 8,
10 wherein said reflective layer(s) (14) or said mirror mount (17) are adapted to deflect optical signals between multiple first optical paths provided said coupling device (8) and multiple corresponding second optical paths provided by multiple waveguides (2) or waveguide structures (3).

15 10. Optical connector assembly according to claim 8 or 9, wherein said mirror mount (17) comprises reference means to position said mirror mount (17) in said second optical path (7).

11. Optical connector assembly according to claims 8-
20 10, wherein said mirror mount (17) comprises further reference means to align said mirror mount (17) and said optical component (15), comprising corresponding reference means, as to optically couple said first optical path (6) to said second optical path (7).

25 12. Optical connector assembly according to any of the claims 8-11, wherein at least one layer of said layer stack (1) is adapted to position said mirror mount (17) in said second optical path (7).

30 13. Optical connector assembly according to claim 12, wherein said layer stack (1) exhibits a space (23) under said mirror mount (17) for fixing said mirror mount (17).

14. Optical connector assembly according to claim 12, wherein said mirror mount (17) is supported by a cladding layer (12) of the waveguide (2) or waveguide structure (3).

35 15. Optical connector assembly according to claim 12, wherein said mirror mount (17) is supported by support structures (24).

16. Optical connector assembly according to any of the claims 8-15, wherein said coupling device (8) comprises said mirror mount (17).

5 17. Optical connector assembly according to any of the claims 6-15, wherein said mirror mount (17) and said optical component (15) are integrated in said coupling device (8).

18. Optical connector assembly according to any of the preceding claims, wherein said first reference means (19) and second reference (20) means have restricted dimensions in said
10 x-y plane.

19. Optical connector assembly according to any of the preceding claims, wherein said first reference means (19) and said second reference means (20) are guide reference means or index reference means.

15 20. Optical connector assembly according any of the preceding claims, wherein said second reference means (20) are provided in one layer of said layer stack (1).

21. Optical connector assembly according to any of the preceding claims, wherein said second reference means (20) are
20 located in the layer stack while said second reference means (20) remain available for aligning.

22. Optical connector assembly according to claim 21, wherein said second reference means (20) are located in the layer stack corresponding to a layer (12) of the waveguide (2)
25 or waveguide structure (3).

23. Optical connector assembly according to claim 22, wherein said second reference means (20) are located on top of the layer stack (1).

24. Optical connector assembly according to any of the
30 preceding claims, wherein said layer stack (1) is a printed circuit board or backplane.

25. Coupling device (8) for use in a optical connector assembly according to any of the preceding claims.

26. Coupling device according to claim 25, wherein
35 said first reference means (19) are guide reference means, said guide reference means defining a plane that is substantially parallel to said x-y plane.

27. Method for aligning a coupling device (8), providing at least one first optical path (6), to at least one waveguide structure (3), comprising at least one optical waveguide (2), in at least one x-y plane of a layer stack (1),
5 said at least one waveguide (2) providing at least one second optical path (7), deflecting from said first optical path (6), said coupling device (8) comprising first reference means (19), said method comprising the steps of

- 10 - applying second reference means (20) in at least one layer of said layer stack (1) in a predetermined x-direction and y-direction relative to said waveguide structure (3);
- 15 - aligning said coupling device (8) and said waveguide structure (3) by matching said first reference means (19) in the x- and y-direction of said x-y plane with said second reference means (20).

28. Method according to claim 27, wherein said second reference means (20) are applied in a layer (12) of said layer
20 stack (1) corresponding to a layer of the waveguide (2) or waveguide structure (3) and/or on top of said layer stack (1).

29. Method according to claim 27 or 28, wherein third reference means (22) are applied on said coupling device (8) for aligning a mating optical device, providing a third
25 optical path (27), with said waveguide (2) or waveguide structure (3) as to optically couple said second optical path (7) and said third optical path (27).

30. Method according to claim 29, wherein said first reference means (19) and said third reference means (22) are
30 applied in predetermined positions relative to each other.

31. Method according to any of the claims 29 or 30, wherein said first reference means (19) and second reference means (20) are guide reference means or index reference means.

32. Method according to any of the claims 27-31,
35 wherein a reflective layer (14) is applied on a facet of said waveguide (2) or a mirror mount (17) is provided in said second optical path (7).

33. Method according to claim 32, wherein at least one layer (12) of said layer stack (1) is adapted to support said mirror mount (17) or said coupling device (8) in said second optical path (7).

5 34. Method according to claim 33, wherein said mirror mount (17) is supported by support structures (24) provided in a space (23), said space (23) at least substantially extending underneath said mirror mount (17).

10 35. Method according to claims 32-34, wherein said mirror mount (17) is fixed in said layer stack (1) by providing an adhesive substance (25) in at least a part of said space (23) underneath said mirror mount (17).

15 36. Method according to claim 35, wherein said adhesive substance (25) exerts a pulling force on said mirror mount (17) to accurately position said mirror mount (17) in said second optical path (7).